CLAIMS

What we claim is:

1. An antimicrobial sol-gel film comprising at least one inorganic antimicrobial agent, wherein said film exhibits a log kill rate for *Klebsiella pneumoniae* of at least 0.5 as measured under a modified plate contact method.

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2. The antimicrobial sol-gel film of Claim 1 wherein said film exhibits a log kill rate for *Klebsiella pneumoniae* of at least 1.0.

3. The antimicrobial sol-gel film of Claim 2 wherein said film exhibits a log kill rate for *Klebsiella pneumoniae* of at least 2.0.

4. The antimicrobial sol-gel film of Claim 3 wherein said film exhibits a log kill rate for *Klebsiella pneumoniae* of at least 3.0.

5. The antimicrobial sol-gel film of Claim 4 wherein said film exhibits a log kill rate for *Klebsiella pneumoniae* of at least 3.5.

6. A hard surface substrate that exhibits a melt and/or heat distortion temperature of at least 100°C, to which the sol-gel film of Claim 1 has been applied.

7. A hard surface substrate that exhibits a melt and/or heat distortion temperature of at least 100°C, to which the sol-gel film of Claim 2 has been applied.

8. A hard surface substrate that exhibits a melt and/or heat distortion temperature of at least 100°C, to which the sol-gel film of Claim 3 has been applied.

9. A hard surface substrate that exhibits a melt and/or heat distortion temperature of at least 100°C, to which the sol-gel film of Claim 4 has been applied.

10. A hard surface substrate that exhibits a melt and/or heat distortion temperature of at least 100°C, to which the sol-gel film of Claim 5 has been applied.

11. A hard surface substrate that exhibits a melt and/or heat distortion temperature of at least 300°C, to which the sol-gel film of Claim 1 has been applied.

12. A hard surface substrate that exhibits a melt and/or heat distortion temperature of at least 300°C, to which the sol-gel film of Claim 2 has been applied.

13. A hard surface substrate that exhibits a melt and/or heat distortion temperature of at least 300°C, to which the sol-gel film of Claim 3 has been applied.

14. A hard surface substrate that exhibits a melt and/or heat distortion temperature of at least 300°C, to which the sol-gel film of Claim 4 has been applied.

15. A hard surface substrate that exhibits a melt and/or heat distortion temperature of at least 300°C, to which the sol-gel film of Claim 5 has been applied.

16. A hard surface substrate to which a sol-gel film has been applied over at least a portion of the surface thereof, wherein said hard surface substrate exhibits a log kill rate for *Klebsiella pneumoniae* of at least 0.5, as measured under a modified plate contact method, at said portion to which said sol-gel film has been applied.

17. A hard surface substrate to which a sol-gel film has been applied over at least a portion of the surface thereof, wherein said hard surface substrate exhibits a log kill rate for *Klebsiella pneumoniae* of at least 1.0 at said portion to which said sol-gel film has been applied.

18. A hard surface substrate to which a sol-gel film has been applied over at least a portion of the surface thereof, wherein said hard surface substrate exhibits a log kill rate for *Klebsiella pneumoniae* of at least 2.0 at said portion to which said sol-gel film has been applied.

19. A hard surface substrate to which a sol-gel film has been applied over at least a portion of the surface thereof, wherein said hard surface substrate exhibits a log kill rate for *Klebsiella pneumoniae* of at least 3.0 at said portion to which said sol-gel film has been applied.

20. A hard surface substrate to which a sol-gel film has been applied over at least a portion of the surface thereof, wherein said hard surface substrate exhibits a log kill rate for *Klebsiella pneumoniae* of at least 3.5 at said portion to which said sol-gel film has been applied.

21. The hard surface substrate of Claim 18 exhibiting the same log kill rate after said substrate has been immersed in a heated caustic bath, having a pH level of at least 12, for 48 hours.

22. The hard surface substrate of Claim 19 exhibiting the same log kill rate after said substrate has been immersed in a heated caustic bath, having a pH level of at least 12, for 48 hours.

23. The hard surface substrate of Claim 20 exhibiting the same log kill rate after said substrate has been immersed in a heated caustic bath, having a pH level of at least 12, for 48 hours.